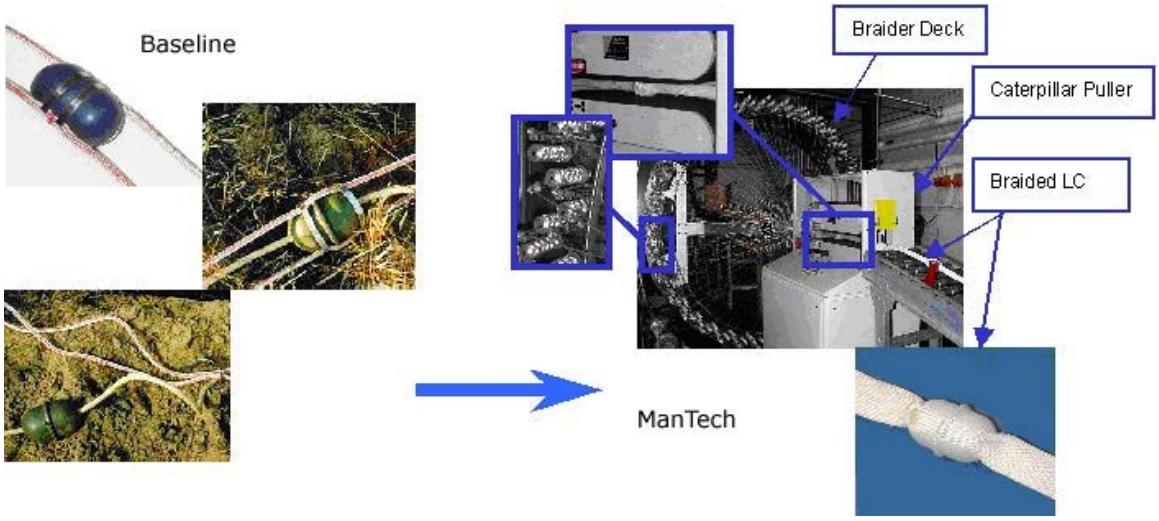
LINE CHARGE MANUFACTURING TECHNOLOGY (LN CHG): IMPLEMENTATION OF OVERBRAIDING TECHNOLOGY FOR THE ANTI-PERSONAL OBSTACLE BREACHING SYSTEM (APOBS)



Overbraided APOBS

ABSTRACT

The United States Marine Corps and the United States Army have requirements to breach pathways through obstacles and minefields for the rapid advancement of troops. The Anti-Personnel Obstacle Breaching System (APOBS) addresses possible shortcomings of the Mine Clearing Line Charge (MICLIC) and the Bangalore Torpedo. The APOBS is a man-portable, rocket-delivered explosive line charge that is designed to clear a pathway through anti-personnel mine and obstacle fields for the rapid advancement of ground assault forces. The baseline design of the line charge assembly of the APOBS consisted of front (25 meters in length) and back (20 meters in length) line charge segments containing a total of 108 grenades. The grenades were connected with detonation cord and two nylon rope strength members, which run parallel to the detonation cord and were connected to each grenade with two band clamps. The process of attaching the ropes to the grenades with the band clamps was a labor-intensive operation and a reliability concern. Testing of the baseline design during the development phase indicated the potential problem of band clamps and/or ropes breaking during deployment.

The objective of the Line Charge Manufacturing Technology Project was to develop and demonstrate an alternate grenade attachment concept that improved the manufacturing process for the APOBS line charge assembly. A process was sought that lent itself to automation, was operator independent, and hence, produced a more reliable product. This project evaluated various concepts provided by private industry and the Indian Head Division. The project resulted in the successful development and demonstration of a material overbraid that replaces the existing nylon ropes and band clamps of the APOBS grenade. Successful testing of the overbraided APOBS has led to the transition of the technology to the Ensign-Bickford Co., the current APOBS production contractor.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The overbraid design resulted in a reduction of attachment components from 5 to 1 and eliminated the sharp edges of the band clamp design. It is also more process insensitive than the

original baseline clamp design. The results of static testing conducted on the overbraid design indicated an increase in strength member strength from 3200 to 4000 pounds and an increase in grenade slip force from 650 to over 2600 pounds. Functional testing of line charge segments indicated similar fragmentation pattern and similar performance as the baseline design in defeating the triple strand concertina wire obstacle.

Implementation and Technology Transfer:
The Ensign-Bickford Company (EBCo) was awarded the Marine Corps contract to develop, first article test, and eventually go into production with the APOBS. EBCo conducted tests to evaluate both their ManTech developed grenade attachment concept and the overbraid design. The overbraid technology transfer was initiated using a teaming arrangement, in which, Indian Head Division braided the EBCo supplied hardware pre-assemblies. Based on the results of EBCo conducted tests, and producibility concerns, the braided design was selected for the manufacture of their First Article Test (FAT) samples. To complete the technology transfer, Indian Head representatives assisted EBCo in setting-up a braiding facility and ensuring that it produced an acceptable product. EBCo produced 28 APOBS for FAT and successfully subjected them to a full range of insensitive munition, environmental and functional tests. Seventy-five systems were produced for Pre-Production Operational Testing before production. EBCo has now fully implemented the overbraid technology. They have delivered 7225 systems with 300 to go under the current contract.

Expected Benefits:
The benefits from this project are weight savings, increased reliability, cost avoidance, a reduction in the quantity of components for the line charge assembly, and hence, improved producibility. The braiding process developed within this project is directly applicable to any line charge or net array system that incorporate discrete point masses of explosives.

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